

The horse chestnut scale insect on lime trees in Glasgow

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In June 2008 a number of scale insects were observed on lime trees (*Tilia sp.*) in a suburban garden on Newark Drive, Pollokshields, on the south side of Glasgow (NGR 2572 631). The scale insects were round, about 5-6mm in diameter, and each sat on a white "cotton cushion" which made them conspicuous against the dark tree bark. They were scattered on the trunk, above about 3m height, or on small groups on the underside of lower branches.. Some were also observed on sycamore (*Acer pseudoplatanus*) and a red horse chestnut (*Aesculus x carnea*) in the same garden. No such scale insects had been observed previously in this garden (occupied by MO'R) over the last 40 years. A search of the local area revealed similar infestations on lime trees throughout Maxwell Park (NGR 2568 632) and on both lime and sycamore in Titwood Park (NGR 2573 629) with one lime tree at Titwood showing a very heavy infestation (Photos 1 and 2). Similar infestations were also observed in June 2008 on trees in the car park of a bank on Fenwick Road, Giffnock (NGR 2562 6591) and along the River Cart on Holmhead Crescent, Cathcart (NGR 2583 606). The scale insect infestations were again evident, though perhaps less abundant, at all these locales in June 2009 and 2010.

Some of the scale insects were removed for microscopical examination and they have been identified as the horse chestnut scale insect (*Pulvinaria regalis* – Hemiptera: Coccoidae), an alien species that is probably asian in origin.. *P. regalis* was unknown in Europe until the 1960s, when it was introduced to southern Britain and France. It has since been recorded throughout Europe including Denmark, Switzerland, Germany, Luxembourg and the Netherlands on urban trees and shrubs. The new Glasgow record is almost certainly the most northerly find in the UK (Christopher Malumphy, Pers. Comm.).

There are three scale insect species likely to be confused with *P. regalis* in the UK, i.e. brown scales with white woolly ovisacs; *Pulvinaria hydrangeae* (the cottony hydrangea scale), *Pulvinaria floccifera* (the cottony camellia scale) and *Pulvinaria vitis* (the woolly current scale). Unlike *P. regalis*, both *P. hydrangeae* and *P. floccifera* are typically found on the foliage rather than the stems/trunks of their hosts, and *P. vitis* is found on the stems and thinner branches.

All four *Pulvinaria* species are polyphagous. The number of hosts *P. regalis* is able to exploit will have facilitated its spread. Globally *P. regalis* is recorded on around 65 different host species from 24 families, *P. hydrangeae* on 19 species from 11 families, *P. floccifera* on 63 species from 35 families, and *P. vitis* on 62 species from 16 families.

Female *P. regalis* are large and rich brown (up to 7mm long). The males are smaller and paler (up to 3mm long). Males are usually present in much smaller numbers than females. The females are capable of reproducing by parthenogenesis. Eggs hatch in June-July and the first instars ('crawlers') migrate to the underside of the leaves and start to feed. In September the nymphs move to feed on the twigs through the winter. Development during this time is slow. By May they are mature and females move to the main branches and trunks to lay eggs. During these migrations many may fall from their hosts onto adjacent plants and objects. Ovisacs have been found attached to metal railings and brick walls close to lime infestations in London (Chris Malumphy Pers. Comm.). They produce up to 2000 eggs and die shortly after oviposition, whilst the eggs remain sheltered by the dead scale. Even though infestations can be extremely heavy, the main effect seems to be reducing the ornamental appeal of hosts rather than their survival.

There is considerable host overlap for the four species. With regards to the host plants observed in Glasgow so far; *P. regalis* and *P. hydrangeae* are both recorded commonly on sycamore and lime but *P. hydrangeae* normally has a more elongated white cottony extension than *P. regalis*. *P. vitis* and *P. regalis* are recorded on horse chestnut and lime but are more common on other hosts such as birch, hawthorn, peach and currant in the UK. *P. floccifera* is not recorded on any of these Glasgow hosts; it is more common on *Camelia*, *Ilex*, *Rhododendron* and *Taxus* in the UK. (see <http://www.sel.barc.usda.gov/scalecgi/hostsof.exe?Family=Coccidae&genus=Pulvinaria&species=regalis&subspecies=>).

With thanks to Christopher Malumphy, Invertebrate Diagnostician, Plant Health, Central Science Laboratory, York for providing information about *P. regalis* and other scale insects.

Plate 1 (a) Heavy infestation of horse chestnut scale insects on lime tree in Titwood Park. **(b)** Horse chestnut scale insects on branch of lime tree in Titwood Park.